Gilberton Coal-to-Clean Fuels and Power Co-Production Project

Participant
WMPI PTY., LLC

Additional Team Members
Nexant, Inc.—collaborator

Shell Global Solutions B.V., U.S.—collaborator

Uhde GmbH.—Engineer, technology supplier, and constructor

SASOL Technology Ltd.—collaborator

Location
Gilberton, Schuylkill County, Pennsylvania

Technology
Shell gasifier and Fischer-Tropsch (FT) synthesis

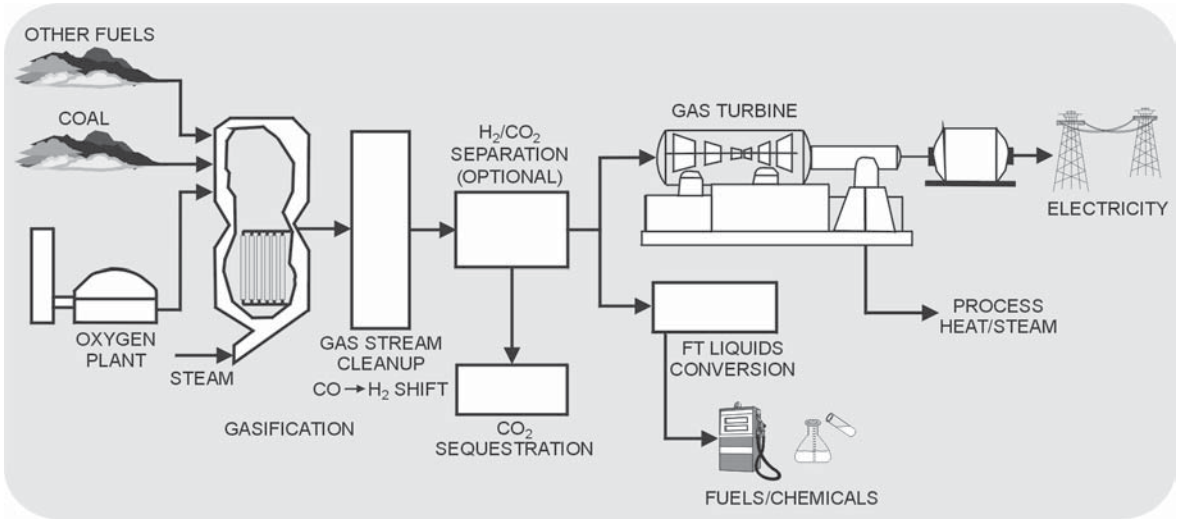
Project Capacity/Production
5,038 bbls/day of ultra-clean fuels and 41 MWe

Coal
Coal-derived wastes, such as anthracite culm

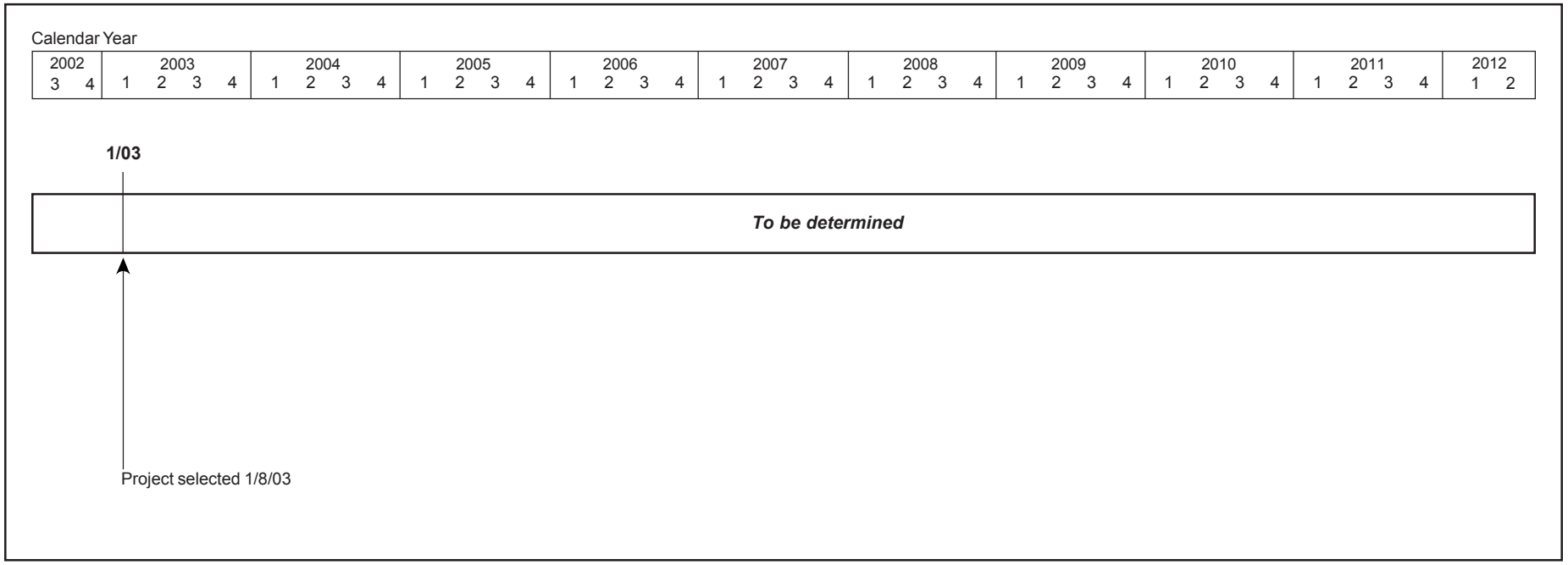
Project Funding

Total	$612,000,000	100%
DOE Share	$100,000,000	16
Participant	$512,000,000	84

Project Objective
To demonstrate gasification of coal wastes to produce a synthesis gas, and in turn electric power, steam, and clean liquid fuels.



Technology/Project Description
The plant will gasify the coal wastes to produce a synthesis gas of hydrogen and carbon monoxide using Shell's oxygen blown gasifier. A portion of the synthesis gas from the gasification process will be converted into synthetic hydrocarbon liquids via a catalytic chemical process known as FT synthesis. The FT naphtha, kerosene, and diesel fuels, being virtually free of sulfur, nitrogen, and aromatics, are superior to their conventional petroleum counterparts in both end-use and environmental properties. The FT naphtha can either be upgraded to a high-octane, clean reformulated gasoline (RFG) or used as sulfur-free onboard reforming feed for hydrogen fuel-cell-powered vehicle applications. The FT kerosene has a low smoke point and potential application as a niche-market jet fuel. FT diesel fuel has a high Cetane Number and offers reduced particulate matter, NO_x, hydrocarbon and CO emissions. Other by-products include sulfur and a vitrified material that has a variety of industrial uses.



Project Status/Accomplishments

This project was selected for award on January 8, 2003. Negotiations are currently in progress. The cooperative agreement is expected to be issued by late-2003. The project duration is expected to be six years.

Work is continuing on preparing the Environmental Impact Statement. The public scoping meeting was held on May 5, 2003. Other preaward activities, such as securing project financing, preparing an estimate for the lump sum turnkey price, and characterization of the feedstock, are also underway.

Commercial Applications

A primary benefit of this project is that it applies clean coal technology to address a long-standing environmental reclamation issue associated with the mining and production of coal. This project offers a unique integration of several key technologies to, for the first time, convert 4,700 tons/day of coal waste materials (referred to as anthracite culm in this case) into 41 MWe of clean electric power and over 5,000 barrels per day of ultra-clean transportation fuels. This project will process about 1.0 million tons per year of coal waste materials from the Gilberton site. It has been estimated that from past coal mining operation, about 200–300 million tons of this material can be found across Pennsylvania alone. A similar amount is present in Illinois. If successful, this technology could be applied in many regions of the country enabling reclamation of lands where coal wastes are currently stockpiled and significantly reduce waste disposal activities from operating coal mines. The transportation fuels produced will be in the form of ultra-clean, high-cetane diesel fuel from the FT process and contain no sulfur or aromatics. The FT naphtha can be upgraded to clean-burning reformulated gasoline. FT naphtha is also an excellent feedstock for steam cracking for olefin production, or as onboard reforming feed for fuel cell powered vehicles. The proposed process scheme is very flexible. It can use coal, coal wastes, petroleum coke, and biomass alone, or as a blended feedstock to make synthesis gas that can be converted into a variety of beneficial products such as electricity, process heat, transportation fuels and other chemical feedstocks. The combination of the Shell gasifier and the use of the Rectisol™ process will remove contaminants from the plant's effluent to very low levels. In fact, this stream will be concentrated in carbon dioxide and offers an opportunity for carbon management options beyond this demonstration project. The gross plant efficiency is estimated to be about 45 percent, based on the total energy input and considering the energy value of all the plant's products. The project will bring this country one step closer to energy independence by demonstrating the ability to economically convert domestic waste coal and low-value energy resources into high-value products in an environmentally sound manner. If successful, this project is of sufficient scale to reduce technical, business, and financial risks, clearing the way for subsequent applications.